Educational Outreach Event Report

Name: Virtual Immersion in Science Inquiry for Teachers (VISIT) Project: Colorado Kick-Off Training

Participant and Author of Report:
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Dates: 6 Oct 2001

Location:
Boulder High School, Colorado

VISIT is an Online Collaboratory for secondary school teachers to participate in scientific investigations of contemporary problems in their localities. They do this through applying spatial analysis technologies such as GIS, multimedia, Internet tools, and remote sensing. VISIT is a three-year project supported by a grant from the National Science Foundation (NSF) Teacher Enhancement program.

The USGS has been involved in the VISIT project since 1999. I joined the VISIT advisory board at that time, and since then, we have held several meetings and telecons to direct the project. Many of these meetings have been held in conjunction with national conferences such as the International Conference on GIS In Education, AAG, and ESRI's User Conference. VISIT had involved teachers largely from Michigan and Massachusetts until Summer 2001, when Steve Wanner (Boulder High School), and I accepted the invitation of the project's principal investigators to bring the project to Colorado.

Steve Wanner traveled for training and consultation with the VISIT staff at Eastern Michigan University in July 2001, and during August and September, we advertised a VISIT kick-off training for Colorado teachers to be held on 6 October. We co-conducted the training at Boulder High School with Beverly Hunter, Piedmont Research Institute, and with much appreciated technical support from Naomi Salaman of the Boulder Valley School District.

Dr. Beverly Hunter, Piedmont Research Institute, one of the principal investigators in the project.

Naomi Salaman, Computer Instructor and IT Manager of Boulder High School.

Through VISIT, teachers could enroll in three online courses. They had the option of (1) working through the courses and training for no credit; (2) obtaining three college credits for these courses for free, because of the NSF grant, or (3) pay a small fee (less than $130) to the Colorado School of Mines for four credits.

VISIT is different from many other projects the USGS has been involved in because it includes a large online collaboratory, a set of web-based tools for teachers, supporters, and leaders of the project to interact online using WebCT technology.

VISIT teachers and scientists learn how to take advantage of recent technological developments, scientific databases, data analysis tools and methods, spatial reasoning, and current scientific investigations. VISIT teachers, scientists and technologists assist individual teachers in locating and applying scientific data sets relevant to their local environment and investigation topics. The learning outcomes include the following:

Define and conduct investigations that support process and content curriculum objectives. Sample current topics include pollutants in surface water; watershed assessment; environmental hazards and toxic release inventories; ecological modeling.

Work with large and multiple scientific databases to extract meaningful information for our classes. Learn to locate, acquire, and use relevant databases in combination with student-gathered data, to support investigations appropriate for our students and local environments.

Use software tools to perform spatial data analysis and reasoning, modeling, and problem solving tasks.

Access scientific knowledge needed to interpret and understand findings in a particular investigation, from the perspective of curriculum concepts.

Manage projects in the classroom; organizing student teams based on the nature of the investigation. VISIT Core Team teachers advise participants based on our classroom experience and facilitate sharing of teachers' knowledge.

Develop and apply rubrics (scoring guides) to assess the teachers own and students' work and learning.

Steve Wanner, geography instructor at Boulder High School, explains collection methods with Global Positioning Systems.

Approximately 20 participants took part in the Boulder High School training event.

In school year 2000 – 2001, VISIT teachers come from high schools in the Detroit, Michigan and Boston, Massachusetts metropolitan areas. VISIT plans to engage at least 1,000 teachers over the three years, in at least six metropolitan areas across the U.S. The scientific research and technology

development is conducted at Eastern Michigan University (EMU) Center for Environmental Information Technology Applications (CEITA), the Rouge Watershed Project, Washtenaw County Department of Environmental and Infrastructure Services, U.S. Environmental Protection Agency, U.S. Army Corps of Engineers, U.S. Geological Survey Great Lakes Science Center, and National Oceanographic and Atmospheric Administration's Great Lakes Environmental Research Laboratory.

In VISIT online courses, teachers learn from pedagogical case studies and project kits, lesson plans, tutorials, and technical assistance, as well as learning from each other. Teachers work with scientists and technologists to develop our own investigations. We contribute to the materials, knowledge, and social support of this learning environment. VISIT Teachers may choose to participate in one or more of the VISIT courses and investigation topics. Each course includes a five-week class online plus additional face-to-face activities scheduled locally.

The overall technology application is called distributed geographic information systems (DGIS). The DGIS tools being composed support data mining, scientific investigation, knowledge base, curriculum integration, instruction management, learning assessment, and online participation. These tools are built upon the COM (component object model) architecture. Major types of software components include the following: MapObjects a software development package from Environmental Systems Research Insitute (ESRI). MapObjects support visualization and analysis of data. ActiveX controls. ActiveXs support scientific analysis and computation. Knowledge-building environment using standard query language and frequently asked questions and comments by the participants. Java beans in Active Server Pages (ASPs). ASPs facilitate online participation, user interactions, and graphic interfaces. Java beans support users as they construct the knowledge base, integrate curriculum, manage instruction and assess learning.

In the workshop, we used GIS to explore the interactions of the natural, cultural, and physical environment. We applied maps, charts, aerial photographs, databases, and images to analyze trends and patterns.

We discussed implementation issues of GIS in the classroom.

The institute was not marketed to just science or geography teachers, but to all teachers who want to support students in exploring the world in a problem solving, computerized environment.

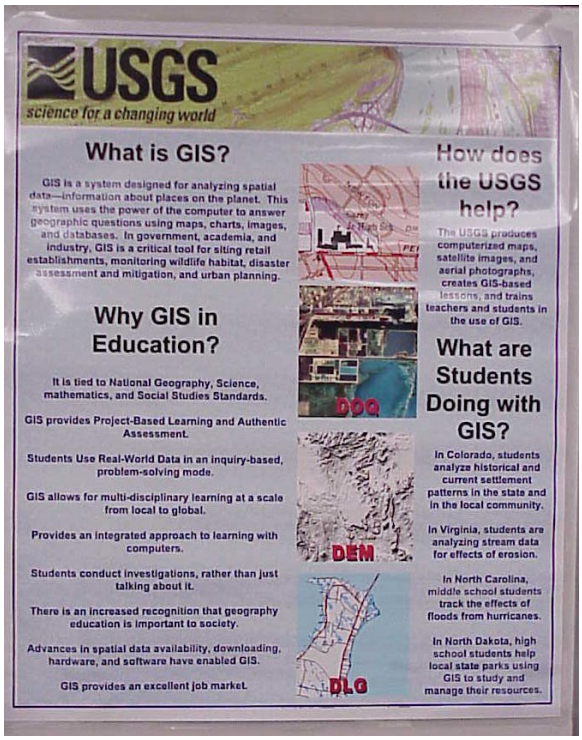
The participants were shown that GIS is a system designed for storing, updating, analyzing, displaying, and manipulating information about places on the planet, otherwise known as spatial data. This system uses the power of the computer to answer geographic questions by arranging and displaying all kinds of data about places in a variety of ways such as with maps, charts, and tables.

Participants were shown through articles about how GIS is used in other classrooms throughout the world. For example, Rhode Island students studied the economic impact of rivers in their communities. In North Dakota, high school students helped local state parks use GIS to study and manage their

resources. Middle school students mapped out alternative sites for a local landfill and ways to monitor its operation. Vermont middle school students used GIS technology, science journals, and photos to determine the origin of a local pond and its ecological relationship to the community.

Next Steps:

We have been answering questions from teachers online, and via direct emails, about data, methods, and GIS technology. We may hold another hands-on training in the future.



One of the GIS In education posters that I created for the workshop.

Summary:

GIS in education is interdisciplinary and has as much to do with systemic change and networking than strictly with the use of inquiry-based tools such as GIS.

There are many valid ways in which to train teachers. This project relies heavily on online courses in an attempt to reach more teachers than with traditional on-site training. The challenge with any online set of courses is to provide support to teachers. In particular, GIS presents technical challenges that require consistent and ongoing support to the educational community using it. A good research project would be to compare the effectiveness of online courses such as VISIT to other methods of training and working with teachers. With the Colorado VISIT group, we attempted to hold a hands-on workshop, followed by online support.

Once again, the positive feedback from all participants confirmed that this type of educational outreach is a good opportunity for the USGS, to work with educators at a value-added level. Many wrote on their evaluation form, “I did not realize the many applications of GIS.” Teachers will be working with much USGS and other spatial data for these GIS-based activities that they incorporate into their curricula, and recognize that we do provide training that is relevant to their needs.

Increased customer spatial awareness and training is essential for the future of all agencies such as the USGS, who rely on a geographically informed public and Congressional funding. When we work with a group in a long-term relationship such as VISIT, I firmly believe this brings us more benefit than a one-time presentation, particularly in the case of providing educators the opportunity to use and apply our digital data. In the case of VISIT, we are bringing together research organizations, a university, and teachers from across the country. We are also working jointly with science teachers and social studies teachers.

Workshop Agenda

Introductions

What is GIS?

What is VISIT?

Hands-on: VISIT collaboratory

Definition and applications of GIS in the curriculum

Hands on cultural geography with GIS

Hands-on physical geography - earthquakes and volcanoes

County Demographics

Population Change 1900-2000

Hurricane analysis

GPS collection and integration

Tornado analysis

Self-exploration of data and procedures

Acknowledgements

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